

Economics of Ergonomics in the Ultrasound Department
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Injury defined:

Work-related musculoskeletal disorders (WRMSD), are defined as injuries caused by or aggravated by workplace activities. They have been described in a number of professions over the years and have been identified in sonographers since 1997. Studies indicate the incidence of sonographer WRMSDs have increased from 84% in 1997 to 90% in 2008. The areas of the body most often involved are: the shoulder (76%), neck (74%), and wrist (59%).¹

Preventative measures:

Given this information, it is important to consider the design of the ultrasound workstation equipment features in addressing the risk factors for WRMSD. Since WRMSDs are caused by multiple factors, injury prevention requires solutions from many sources. Preventative, or control, measures for reducing musculoskeletal injury risk can be broken down into three categories:

1. Engineering controls. These measures eliminate the presence of risk factors in the workplace through design changes in the workstation equipment. Workstations in the ultrasound department include not only the exam room but the PACs and computer workstations as well. Although these are the most expensive measures initially, they can ultimately lead to cost savings over the long term.

2. Administrative controls. These measures reduce the worker's exposure to risk factors through changes in schedule and workload. Many sonographers do not get any breaks during the day. Sonographers need time for their muscles and tendons to recover between patients. Rotating sonographers' job and task assignments reduces the employee's contact with job hazards. In addition, the same sonographer should not be assigned to bedside studies for the entire day or assigned to rooms that do one type of exam, especially those that are injury producing. A variety of work tasks and equipment is necessary to allow for the utilization of different muscle groups, hence providing recovery & relief. A reasonable flow of patients with sufficient time to complete the study and its associated paperwork is the most efficient system and one that reduces the risk of injury.

3. Sonographer solutions. Sonographers can learn how to reduce their exposure to risk factors and to injury-producing actions through ergonomic education and training. The best equipment, if used incorrectly, will not create an ergonomic workstation. Sonographers must learn the risk factors, understand the importance of good postural alignment and work techniques, and modify their work behaviors accordingly.

Economics of ergonomics:

The cost of occupational injury is phenomenal. The losses to the employer encompass the medical costs of an injury, the cost of replacement staff, Worker’s Compensation, loss of revenue and loss of an experienced, stable workforce. The cost to the worker includes not only monetary hardship, but also the possibility of permanent injury, chronic pain, and loss of their professional career.

In the U.S., WRMSDs are the most prevalent workplace injury. They account for up to 60% of all workplace illnesses, according to the United States Department of Labor, costing businesses \$20 billion per year.^{2,3} Over 300,000 are reported each year, according to our Bureau of Labor Statistics. They account for 56% of all work-related illnesses reported to OSHA and for most of the Worker’s compensation costs -- one out of every 3 dollars of Worker’s compensation costs are spent on MSD’s in the U.S. A Worker’s compensation claim can cost \$29,000-32,000 per year per injury. These injuries cause 640,000 lost workdays, which translates into loss of productivity and, ultimately, revenue.

There are 2 categories of cost when a worker incurs an injury. Direct costs are those associated with Worker’s compensation claims and the costs involved in treating an injury. Medical costs are increasing 2.5 times faster than any other employee benefit cost.

The indirect costs are the most expensive, estimated at approximately \$150 billion/year, and include the costs associated with the loss of an employee. Departments are challenged to maintain and even increase productivity so the loss of an experienced sonographer can have a significant impact.

Average estimated direct and indirect costs of a work-related musculoskeletal disorder (WRMSD) of the shoulder in a sonographer⁸:

Worker’s compensation	\$30,500
Medical expenses for a shoulder injury (excluding surgery)	\$20,000
Hiring replacement staff	\$60,000
Revenue loss (estimate based on time lost for one year by one sonographers)	\$520,000
Recruiting of new sonographers	\$10,500

**Compare the costs: Ergonomics versus Sonographer injury
(estimated average costs)**

Ultrasound system \$200,000 (will vary with type of system & transducers)	Medical bills \$20,000/yr (average shoulder injury)
Exam table \$7,000	replacement staff \$63,000
Chair \$900	recruiting costs \$10,000
Adaptive equipment \$1500	Loss of exam income \$520,000/yr
Total: \$209,400 (initial purchase) Spread over 5 years, per year cost: \$41,880	Total: \$610,000 per year cost

In conclusion:

It is critical to consider ergonomics when designing workstations and when purchasing workstation equipment. Dollars spent on this equipment have an excellent return on investment (ROI). Studies throughout industry have shown a significant decrease in worker turnover, lost workdays and an annual decline in Worker's compensation costs. This investment also leads to improved performance of the sonographers and improved employee morale.

Ergonomics provide the foundation for effective management and for experienced workers to perform at their best, thus increasing productivity and profits and ensuring quality patient care.

References:

1. Pike I, Russo A, Berkowitz J, et al. The prevalence of musculoskeletal disorders among diagnostic medical sonographers. *J Diag Med Sonogr.* 1997;13:219-227.
2. Jeffress C. OSHA Testimony April 2000. Available on the U.S. Department of Labor Web site:
www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=TESTIMONIES&p_id=184. Accessed July 2002.
3. Bureau of Labor Statistics. Available on the U.S. Department of Labor Web site:
www.bls.gov. Accessed July 2002.
4. Browne C, Bernard M, Faithfull D. Occupational repetition strain injuries. *Med J Austr.* 1984;17:329-332.
5. Gregory V. Musculoskeletal injuries: An occupational health and safety issue in sonography. *Sound Effects.* 1998;30:30-34.
6. Thompson J, Phelps T. Repetitive strain injuries: How to deal with the \epidemic of the 1990s. *Postgrad Med.* 1990;88:143-149.
7. Grieco A, Molteni G, DeVito G, Sias N. Epidemiology of musculoskeletal disorders due to biomechanical overload. *Ergonomics.* 1998;41:1253-1260.
8. 1998 Liberty Mutual data-average costs for all types of MSDs. Available on the Ergoweb Web site: www.ergoweb.com; Posted 2001. Accessed July 2002.